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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

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“Step Out From the Old to the New”

IS 8823 (1978): Triangular Straightedges [PGD 25:
Engineering Metrology]



“ज्ञान से एक नये भारत का निर्माण”

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“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR
TRIANGULAR STRAIGHTEDGES

1. **Scope** — Covers the requirements of triangular straightedges used for checking angle and flatness of machine tools dovetails.
2. **Terminology**
- 2.1 **Flatness Tolerance** — The maximum permissible distance between two imaginary parallel planes within which the surface under consideration (working surface) may just be enclosed (see Fig. 1).

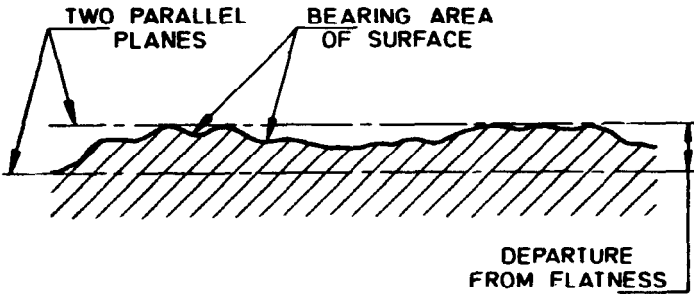
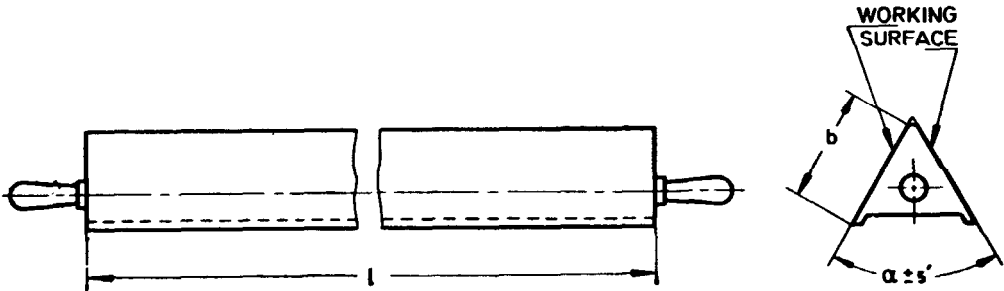


FIG. 1 EXAGGERATED ILLUSTRATION OF FLATNESS TOLERANCE

- 2.2 **Nominal Size** — The working length (*l*) of triangular straightedge (see Table 1).
3. **Dimensions and Tolerances** — Shall be as given in Table 1 and Table 2.

TABLE 1 DIMENSIONS OF TRIANGULAR STRAIGHTEDGE
All dimensions in millimetres.



<i>l</i>	<i>b</i> for α			
	45°	50°	55°	60°
250	50	50	45	45
500	70	70	60	60
750	90	90	80	80
1 000	110	110	100	100
1 250	130	130	110	110
1 500	160	160	130	130
2 000	200	200	160	160

4. **Accuracy**
- 4.1 **Flatness of Working Surfaces** — The bearing area of the working surfaces shall be flat to within the tolerances given in Table 2.
- 4.1.1 In addition to the tolerances on flatness, the local errors of straightness in the working surface of triangular straightedges 750 mm and larger shall not exceed 0.004 mm per 300 mm.

TABLE 2 TOLERANCES ON FLATNESS OF WORKING SURFACES

(Clauses 3 and 4.1)

All dimensions in millimetres.

<i>l</i>	Tolerance
250	0.003
500	0.004
750	0.006
1 000	0.008
1 250	0.013
1 500	0.013
2 000	0.016

4.2 Bearing Area — Triangular straightedges finished by hand scraping shall have a bearing area of not less than 25 percent. (A recommended method of determining bearing area is given in Appendix A). Triangular straightedges shall have a surface roughness not exceeding $0.8/\mu\text{m}$ Ra (see IS : 3073-1967 Assessment of surface roughness).

5. Material

5.1 The triangular straightedges shall be made from close-grained cast iron conforming to Grade 20 of IS : 210-1970 'Specification for grey iron castings (*second revision*)'. The hardness of the material shall be 170 to 220 *BHN*.

5.2 The triangular straightedges shall be given suitable heat treatment to relieve internal stresses. A recommended treatment is given in Appendix B.

6. Workmanship and Finish

6.1 The triangular straightedges shall be free from blow holes and porous patches. The working faces of the straightedges shall be free from any repairs, such as plugging and filling.

6.2 The working surfaces of triangular straightedges shall be finished by scraping.

6.3 Suitable chamfer shall be provided over the three edges of the working faces to prevent chipping of the edges and all other sharp edges shall be removed.

7. Designation — A triangular straightedge of nominal size 500 mm, included angle 50° shall be designated as:

Triangular Straightedge $500 \times 50^\circ$ IS : 8823

8. Test

8.1 The recommended method of testing the triangular straightedges are given in Appendix C.

8.2 Autocollimator and spirit level may also be used for testing accuracy.

9. Handles — Triangular straightedges shall be provided with suitable handles on either side. Recommended material for handles: steel conforming to 13S25 of IS : 4431-1967 'Specification for carbon and carbon-manganese free-cutting steels'.

10. Packing — The triangular straightedges shall be protected from climatic conditions by a suitable protective coating. Each straightedge shall be supplied in a case.

11. Marking — Each triangular straightedge shall have legibly and permanently engraved upon it the manufacturer's name or trade-mark and the nominal size.

11.1 ISI Certification Marking — Details available with the Indian Standards Institution.

APPENDIX A

(Clause 4.2)

DETERMINATION OF THE PROPORTION OF BEARING AREA

A-1. In order to determine the proportion of the bearing area of a scraped cast iron straightedge, its surface is first blued and rubbed with a small surface plate so that the small bearing areas are brought out clearly into view. A small glass plate on which an area $25\text{ mm} \times 25\text{ mm}$ has been ruled

into 100 small squares is then placed upon the surface. Each small square is then observed in turn and a note made of the estimated fraction of its area (in tenths) which is occupied by a 'high spot' on the surface underneath. The addition of all these fractions gives the percentage of the bearing area of the surface over the region tested. The test can be repeated at other positions on the surface in order to obtain a fairly average figure.

A-1.1 It may be mentioned that after testing a few surfaces by this method, the results obtained, coupled with the general appearance of the bearing areas, enable a fairly close estimate to be made of the proportion of bearing area of a surface merely from its general appearance.

APPENDIX B

(Clause 5.2)

RECOMMENDED HEAT TREATMENT FOR THE TRIANGULAR STRAIGHTEDGES

B-1. The castings, after being rough machined, should be placed in a furnace and heated uniformly to a temperature of not less than 500°C, but not exceeding 575°C, and maintained at this temperature for 3 hours or such longer time as may be necessary for the whole of the casting to become uniformly heated.

B-2. The castings should be protected from the direct heat of the flames by means of suitable baffle plates and the heating should be as uniform as possible throughout. In the case of small castings, more uniform heating may be obtained by packing them in iron fillings or other suitable material in boxes.

B-3. It is essential that cooling takes place as gradually as possible. The furnace should not be opened and, after the heat has been turned off, the castings should remain in the furnace to allow them to cool naturally. The furnace should not be opened until the temperature has fallen below 100°C.

APPENDIX C

(Clause 8.1)

RECOMMENDED METHODS OF TESTING TRIANGULAR STRAIGHTEDGE

C-1. Methods of Test

C-1.1 The accuracy of flatness of the working faces of triangular straightedge may be tested by direct comparison with a master surface plate of known accuracy. Place the straightedge on its edge over the surface plate. Two equal slip gauge should be placed just below the points of best support. The gap between the lower working face of the straightedge and the surface plate may be measured on various points by inserting slip gauges. This is an indication of the degree of flatness along the length of the straightedge (see Fig. 2).

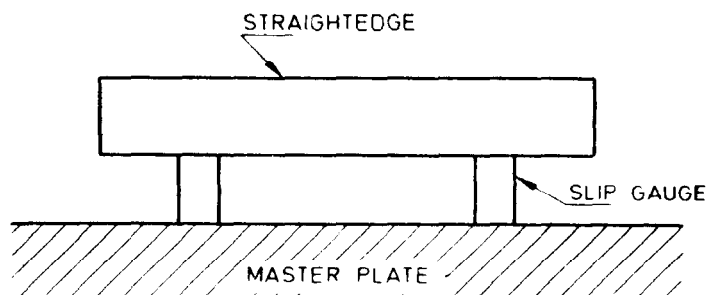


FIG. 2 TESTING OF FLATNESS BY SLIP GAUGES

C-1.2 Alternatively a wedge method may be adopted to check the flatness.

Great certainty in measurement is obtainable if the two supporting slips are unequal, so that the straightedge lies at a slight inclination to the surface. The difference between the slip value is made a definite amount, say 0.10 mm. Divide the distance 0.554 between the supports into 10 equal parts and suitably mark the straightedge as shown in Fig. 3, where the distance between the two supports differing by 0.1 mm is divided into ten parts. If both straightedge and surface are perfectly straight, the gap will vary by 0.01 mm at each point making a wedge. Slips can be inserted corresponding to each position and will make contact with both surfaces exactly at the marked positions. If there are errors in flatness of the straightedge, the slips will not fit exactly opposite their corresponding marked positions but will be displaced one way or other along the straightedge by amounts proportional to the errors. Thus the error may be measured.

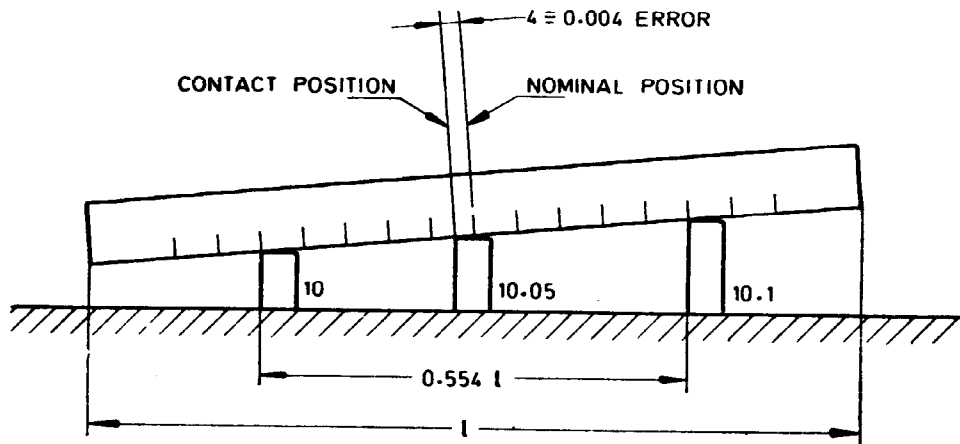


FIG. 3 TESTING OF FLATNESS BY WEDGE METHOD